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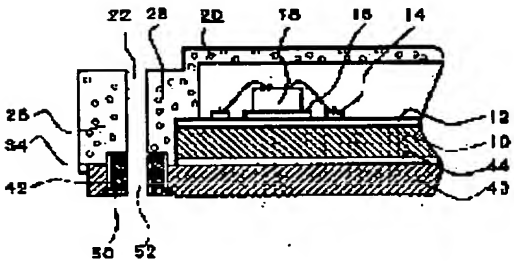
(54) HYBRID INTEGRATED CIRCUIT



(57)Abstract:

PURPOSE: To provide a small hybrid integrated circuit in which the creep discharge to the section of a screw hole for connection with a cooling fin is prevented.

CONSTITUTION: An insulated metal substrate 40 with an insulating adhesive layer 44 has a hole 42, into which a little larger bushing 50 is forced. The bushing serves to insulate the section of the hole 42 in the metal substrate 40 so as to prevent the creep discharge between the circuit on another insulated metal substrate 10 and the substrate 40 and between the circuit and a cooling fin. Therefore, it is possible to make the two substrates substantially in the same size; this results in a reduction in device area of a hybrid integrated circuit.

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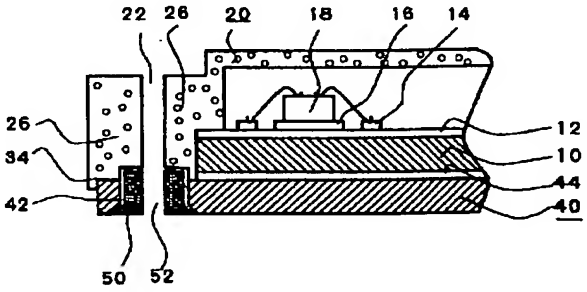
(54)【発明の名称】　混成集積回路装置

(57)【要約】
【目的】混成集積回路装置を放熱板に接続するネジ孔断面への沿面放電を防止した小型の混成集積回路装置を提供することを目的とする。
【構成】接着層(44)の絶縁を利用するために使用される第２の絶縁金属基板(40)のブッシュ孔(42)には、このブッシュ孔(42)よりやや大口径のブッシュ(50)が圧入される。このブッシュ(50)により第２の絶縁金属基板(40)のブッシュ孔(42)の断面が絶縁被覆されるため、第１の絶縁金属基板(10)上の回路と第２の絶縁金属基板(40)間および図示しない放熱板間の沿面放電が防止される。この結果、第２の絶縁金属基板(40)サイズを第１の絶縁金属基板(10)と略同一にすることができ、混成集積回路装置の平面サイズが縮小される。



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【特許請求の範囲】

【請求項１】　回路パターン上に複数の集積回路素子を固着、搭載した第１の絶縁金属基板と、

混成集積回路装置を放熱板に結合するためのネジ孔を備え、前記第１の絶縁金属基板の搭載回路素子を封止するケース材と、

前記ケース材のネジ孔に対応する位置にブッシュ孔が形成され、第１の絶縁金属基板の集積回路素子搭載面の反対面に絶縁性の接着剤により固着される第２の絶縁金属基板と、

前記第２の絶縁金属基板のブッシュ孔に圧入されるブッシュから構成される混成集積回路装置。

【請求項２】　回路パターン上に複数の集積回路素子を固着、搭載した第１の絶縁金属基板と、

混成集積回路装置を放熱板に結合するためのネジ孔を備え、第１の絶縁金属基板の搭載回路素子を封止する壁に樹脂溜を形成したケース材と、

前記第１の絶縁金属基板の集積回路素子搭載面の反対面に絶縁性の接着剤により固着される第２の絶縁金属基板から構成され、

前記ケース材の樹脂溜から浸透する樹脂により第１の絶縁金属基板の端部を被服したことを特徴とする混成集積回路装置。

【請求項３】　回路パターン上に複数の集積回路素子を固着、搭載した第１の絶縁金属基板と、

混成集積回路装置を放熱板に結合するためのネジ孔を備え、第１の絶縁金属基板の搭載回路素子を封止する壁の前記ネジ孔近傍に樹脂溜を形成したケース材と、

前記第１の絶縁金属基板の集積回路素子搭載面の反対面に絶縁性の接着剤により固着される第２の絶縁金属基板から構成される混成集積回路装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は混成集積回路装置に関し、詳細には、集積回路と絶縁金属基板間および放熱板間の絶縁を改善した混成集積回路装置に関する。

【０００２】

【従来の技術】図３および図４を参照して従来の混成集積回路装置を説明する。なお、図４は図３の円内の構造を説明する断面図である。従来の混成集積回路装置は第１の絶縁金属基板(60)、この第１の絶縁金属基板(60)上に、第１の絶縁層(62)を介して形成したワイアイボンディングパッド(64)、導電路(65)、ダイボンドパッド(66)、その他のパッドからなる回路パターン、ダイボンドパッド(66)上に固着、搭載される集積回路素子(68)等の半導体素子、チップコンデンサ、あるいはチップ抵抗（図示しない）並びに外部リード(70)、主として絶縁性向上のために使用される第２の絶縁金属基板(90)および搭載素子を気密封止するケース材(72)等から構成される。

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【０００３】第１および第２の絶縁金属基板(60)(90)には放熱特性および加工性を考慮して略２ｍｍ厚のアルミニウムが使用され、絶縁性の向上のためにその表面が陽極酸化処理される。第１の絶縁金属基板(60)は矩形であり、混成集積回路装置が略完成した時点で、数単位乃至十数単位の混成集積回路装置基板から単位混成集積回路装置のサイズに分割プレスされる。また、第２の絶縁金属基板(90)はケース材(72)と略同一の平面形状であり、後述するケース材(72)のネジ孔(74)に対応する位置に同軸の孔(92)が形成される。

【０００４】各種パッド(64)(66)および導電路(65)は、ポリイミド樹脂等の接着性を有する熱硬化性絶縁樹脂と略３５μｍ厚の銅箔とのクラッド材を温度１５０℃～１７０℃、１平方センチメートル当り５０～１００Ｋｇの圧力で第１の絶縁金属基板(60)にホットプレスした後、その銅箔をホトエッチングする等して所定パターンに形成される。なお、前記熱硬化性絶縁樹脂はこのホットプレス工程で完全硬化して略３５μｍ厚の第１の絶縁層(62)となる。

【０００５】集積回路素子(68)等の半導体素子およびその他の回路素子にはチップ部品が使用され、集積回路素子(68)は銀ペースト等によりダイボンドパッド(66)に固着される。また、チップコンデンサ、あるいはチップ抵抗、外部リード(70)等の異型部品は半田固着される。これら回路素子は所定のパッド(66)上にスクリーン印刷したソルダーペーストに一時的に付着させた後、リフローして完全固着される。

【０００６】ケース材(72)は例えばファイバグラス・レインホースＰＥＴ（ＦＲＰＥＴ）を略箱形状に射出成形したものであり、通常、その長手方向端部に、混成集積回路装置を放熱板に結合するネジ孔(74)を備える。このケース材(72)はエポキシ含浸ポリエステル不織布を接着シートとして、加熱圧着して（１２５℃、８時間）、第１の絶縁金属基板(60)の終辺部で固着され、その搭載回路素子を封止する。この後、熱硬化性絶縁樹脂、シリコン樹脂等の第２の絶縁層(94)により第１の絶縁金属基板(60)の裏面に第２の絶縁金属基板(90)が接着される。そして、この第２の絶縁層(94)により放熱板と第１の絶縁金属基板(60)上の回路との高い絶縁が達成される。

【０００７】

【発明が解決しようとする課題】従来の混成集積回路装置は第１および第２の絶縁金属基板(60)(90)の表面が陽極酸化処理されていることと第１および第２の絶縁層(62)(94)によりかなりの絶縁強度が得られているものの、さらに高電圧の用途に適する高耐圧構造が求められている。

【０００８】なお、第１の絶縁金属基板(60)の端面と混成集積回路装置を放熱板に結合するネジ孔(74)との距離を大きく設計することによって高耐圧化が達成されるものの、小型化の要求に応えることができない問題を有す

る。従って、本発明の目的は高耐圧構造であって、小型の混成集積回路装置を提供することにある。

【０００９】

【課題を解決するための手段】請求項１の発明は、第２の絶縁金属基板に、放熱板に結合するネジのためのブッシュ孔を形成し、このブッシュ孔にブッシュを圧入した点を主要な特徴とする。請求項２の発明は、第１の絶縁金属基板の搭載回路素子を封止するケース材の壁に樹脂溜を形成した点を主要な特徴とする。

【００１０】請求項３の発明は、放熱板に結合するネジ孔に直近のケース材の壁に樹脂溜を形成した点を主要な特徴とする。

【００１１】

【作用】第２の絶縁金属基板に、放熱板に結合するネジのためのブッシュ孔を形成し、このブッシュ孔にブッシュを圧入する請求項１の構成は、第２の絶縁金属基板のブッシュ孔断面を絶縁被覆し、第１絶縁金属基板上の回路と第２の絶縁金属基板間を絶縁する。

【００１２】第１の絶縁金属基板の搭載回路素子を封止するケース材の壁に樹脂溜を形成する請求項２の構成は、樹脂溜の樹脂の浸透により第１絶縁金属基板の端面および第２の絶縁金属基板のネジ孔の断面を絶縁被覆する。放熱板に結合するネジ孔に直近のケース材の壁に樹脂溜を形成する請求項３の構成は、より簡素な構造、工程により第１絶縁金属基板の端面および第２の絶縁金属基板のネジ孔の断面を絶縁被覆することを可能にする。

【００１３】

【実施例】図１を参照して本発明の第１の実施例を説明する。なお、図１は図４に示した従来例の円内の構造に対応する構造を断面図で示している。本発明の混成集積回路装置は、半導体素子およびその他の回路素子を搭載する第１の絶縁金属基板(10)、この第１の絶縁金属基板(10)の搭載素子を封止するケース材(20)、主として、絶縁性向上のために使用される第２の絶縁金属基板(40)から構成される。

【００１４】第１および第２の絶縁金属基板(10)(40)には放熱特性および加工性を考慮して略２ｍｍ厚のアルミニウムが使用され、絶縁性の向上のためにその表面が陽極酸化処理される。第１の絶縁金属基板(10)は矩形であり、混成集積回路装置が略完成した時点で、数単位乃至十数単位の混成集積回路装置基板から単位混成集積回路装置のサイズに分割プレスされる。また、第２の絶縁金属基板(40)はケース材(20)と略同一の平面形状であり、第１の絶縁金属基板(10)より大面積である。

【００１５】ワイアボンディングパッド(14)、ダイボンドパッド(16)、その他のパッドおよび導電路（図示しない）は、ポリイミド樹脂等の接着性を有する熱硬化性絶縁樹脂と略３５μｍ厚の銅箔とのクラッド材を温度１５０℃～１７０℃、１平方センチメートル当り５０～１００Ｋｇの圧力で第１の絶縁金属基板(10)にホットプレスした後、その銅箔をホトエッチングする等して所定パターンに形成される。なお、前記熱硬化性絶縁樹脂はこのホットプレス工程で完全硬化して略３５μｍ厚の絶縁層(12)となる。

【００１６】集積回路素子(18)等の半導体素子およびその他の回路素子にはチップ部品が使用され、銀ペースト等により所定のパッド(16)に固着される。また、チップコンデンサ、あるいはチップ抵抗、外部リード（何れも図示されていない）等の異型部品は半田固着される。これら回路素子は所定のパッド上にソルダーペーストをスクリーン印刷し、これに一時的に付着させた後、リフローして完全固着される。

【００１７】ケース材(20)はファイバグラス・レインホースＰＥＴ（ＦＲＰＥＴ）を略箱形状に射出成形して得られる。ケース材(20)の壁(26)を、エポキシ含浸ポリエステル不織布を接着シートとして、第１の絶縁金属基板(10)の周辺部に加熱圧着（１２５℃、８時間）して、第１の絶縁金属基板(10)の搭載素子を封止した後、シリコン樹脂あるいは通常の熱硬化性樹脂等による第２の絶縁層(44)により第１の絶縁金属基板(10)の集積回路素子搭載面の反対面に第２の絶縁金属基板(40)が固着される。

【００１８】ケース材(20)には第１の絶縁金属基板(10)の長手方向の端部直近に、この混成集積回路装置を放熱板に結合するためのネジ孔(22)が形成され、その下部にネジ孔(22)より大口径のブッシュ孔が形成される。また、ケース材(20)の下部の複数の辺には第２の絶縁金属基板(40)の位置合わせのための段部(34)が形成される。一方、第２の絶縁金属基板(40)には第１の絶縁金属基板(10)のネジ孔(22)、あるいはブッシュ孔に対応する位置にブッシュ孔(42)が形成され、第２の絶縁金属基板(40)の固着により、ケース材(20)のネジ孔(22)と第２の絶縁金属基板(40)のブッシュ孔(42)が同軸配置される。

【００１９】ネジ孔(52)を備えるブッシュ(50)はフロン樹脂により第２の絶縁金属基板(40)のブッシュ孔(42)よりいくらか大口径に、また、第２の絶縁金属基板(40)の厚さより長く形成され、ブッシュ孔(42)に圧入される。上記のように構成される本実施例では、ブッシュ(50)により第２の絶縁金属基板(40)のブッシュ孔(42)の断面が被覆されるため、第１の絶縁金属基板(10)上の回路と第２の絶縁金属基板(40)との間の高絶縁が確保される。また、第１の絶縁金属基板(10)上の回路とネジ間の沿面距離が増大する。このため、第１の絶縁金属基板(10)の端部とケース材(20)のネジ孔(22)との距離を短くすることができ、混成集積回路装置の小型化が達成される。

【００２０】図２を参照して本発明の第２の実施例を説明する。なお、図２も図４に示した従来例の円内の構造に対応する構造を断面図で示しており、先の実施例に対応する個所には同一の符号を使用している。本実施例では、ケース材(20)の壁(26)に樹脂溜として使用される溝(28)が形成され、第１の絶縁金属基板(10)とケース材(2

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0)の加熱圧着直前に、この溝(28)に流動性の熱硬化性樹脂(48)が適宜の手段で塗布される。そして、図示の状態で、第１および第２の絶縁金属基板(10)(40)を固着する熱処理時に、溝(28)に塗布した熱硬化性樹脂(48)が第１および第２の絶縁金属基板(10)(40)とケース材(20)の間隙に浸透し、硬化して、第１の絶縁金属基板(10)の端部と第２の絶縁金属基板(40)のブッシュ孔(42)の断面を完全に被覆する。なお、ケース材(20)の溝(28)はネジ孔(22)に近い位置の一部に形成すれば足りる。

【００２１】図２は説明のため、第１および第２の絶縁金属基板(10)(40)とケース材(20)の間隙が大きく描かれているが、本実施例によれば、第１の絶縁金属基板(10)上の回路と第２の絶縁金属基板(40)間、あるいは図示しないネジ間の沿面放電が防止されるため第１の絶縁金属基板(10)と第２の絶縁金属基板(40)の基板サイズを殆ど同一にすることができ、極めて小型の混成集積回路が得られる。

【００２２】

【発明の効果】以上述べたように本発明の混成集積回路装置は、第２の絶縁金属基板に、放熱板に結合するネジのためのブッシュ孔を形成し、このブッシュ孔にブッシュを圧入するため、第２の絶縁金属基板のブッシュ孔断面が絶縁被覆され、第１および第２の絶縁金属基板のサイズを略同一とすることができ、結果、小型化が達成される。

【００２３】また、第１の絶縁金属基板の搭載回路素子＊

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＊を封止するケース材の壁に樹脂溜を形成するため、樹脂溜の樹脂の浸透により第１絶縁金属基板の端面および第２の絶縁金属基板のネジ孔の断面を絶縁被覆することができる。この結果、小型化が達成される。さらに、放熱板に結合するネジ孔に直近のケース材の壁に樹脂溜を形成するため、より簡素なケース材構造、工程により第１絶縁金属基板の端面および第２の絶縁金属基板のネジ孔の断面を絶縁被覆することが可能になる。

【図面の簡単な説明】

【図１】第１の実施例の要部断面図。

【図２】第２の実施例の要部断面図。

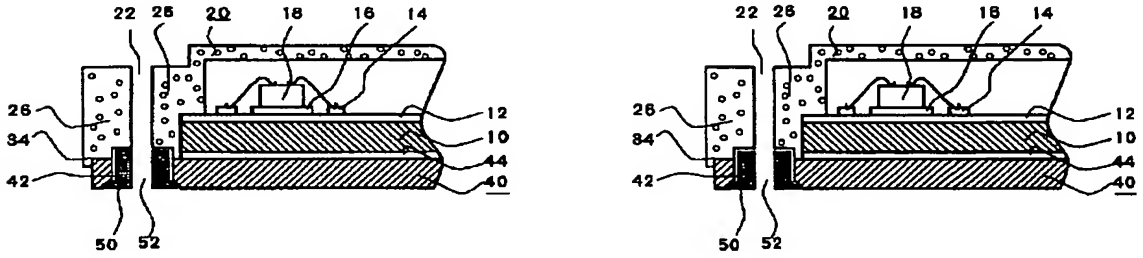
【図３】一部を切断して示す従来例の斜視図。

【図４】従来例の要部断面図。

【符号の説明】

１０　第１の絶縁金属基板
１２　第１の絶縁層
１４　ワイアボンディングパッド
１６　ダイボンドパッド
２０　ケース材
２２　ネジ孔
４０　第２の絶縁金属基板
４２　ブッシュ孔
４４　第２の絶縁層
５０　ブッシュ
５２　ネジ孔

【図１】



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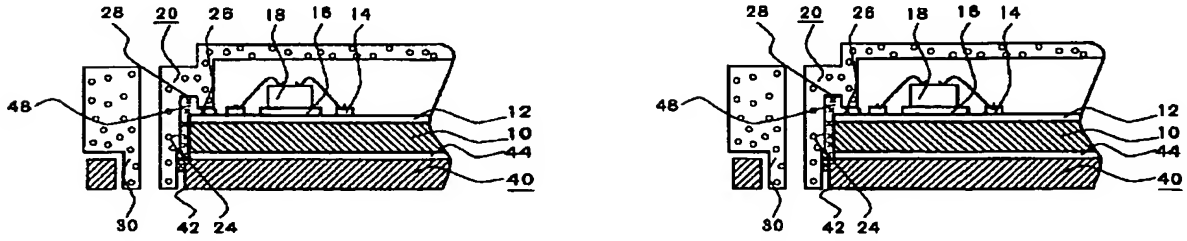

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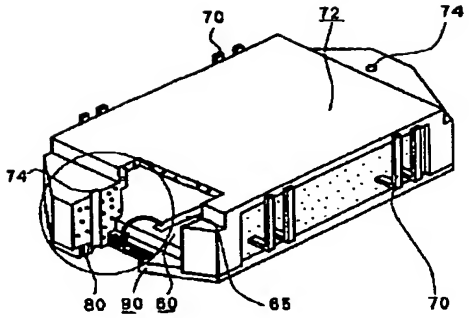
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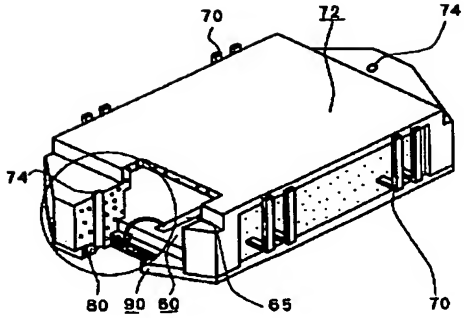
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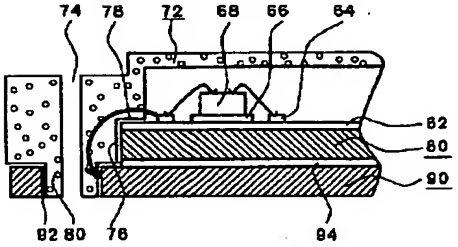
【図４】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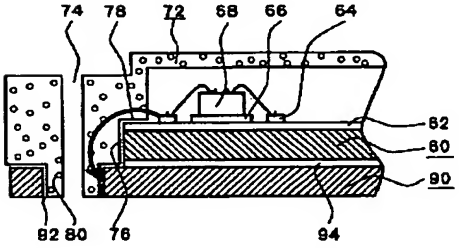
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PATENT ABSTRACTS OF JAPAN

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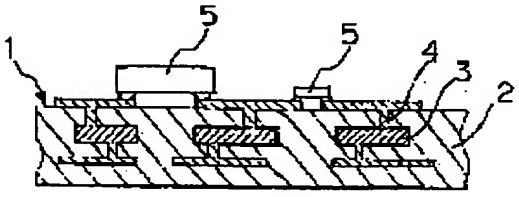
(54) WIRING SUBSTRATE AND ITS MANUFACTURE



(57)Abstract:

PROBLEM TO BE SOLVED: To realize low resistance of a wiring conductor which has extremely small deformation such as waving on the insulated substrate surface, excellent size accuracy and excellent mass productivity.

SOLUTION: A wiring conductor 3 in the thickness of 50μm or more provided in an insulated base material formed of sintered ceramics is reactively hardened before lamination of the other ceramic green sheet having a predetermined wiring pattern using a conductive paste with a binder mainly composed of a high melting point metal and reactive hardening resin to form a conductive material. The wiring board obtained shows a waving at the surface of the insulated base material 2 of 20μmWCMmax or less when high region cutoff value is 2.5mm and standard length is 25mm.

LEGAL STATUS

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[JP,06-177295,A]

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the hybrid integrated circuit equipment which has improved the insulation between an integrated circuit and an insulating metal substrate and between heat sinks in the detail about hybrid integrated circuit equipment.

[0002]

[Description of the Prior Art] Conventional hybrid integrated circuit equipment is explained with reference to drawing 3 and drawing 4 . In addition, drawing 4 is a sectional view explaining the structure in the circle of drawing 3 . Conventional hybrid integrated circuit equipment on the 1st insulating metal substrate (60) and this 1st insulating metal substrate (60) The wye eye bonding pad formed through the 1st insulating layer (62) (64), The circuit pattern which consists of a track (65), a die bond pad (66), and other pads, Semiconductor devices, such as an integrated circuit device (68) fixed and carried on a die bond pad (66), It consists of case material (72) which carries out the hermetic seal of an external lead (70), the 2nd insulating metal substrate (90) used a sake [on an insulating disposition] mainly, and the loading component to a chip capacitor or a chip resistor (not shown) list.

[0003] In consideration of a heat dissipation property and workability, the aluminum of 2mm thickness of abbreviation is used for the 1st and 2nd insulating metal substrates (60) and (90), and anodizing of the front face is carried out for improvement in insulation. The 1st insulating metal substrate (60) is a rectangle, and when hybrid integrated circuit equipment carries out abbreviation completion, the division press of it is carried out from the hybrid integrated circuit equipment substrate of a unit a number unit thru/or more than 10 at the size of unit hybrid integrated circuit equipment. Moreover, the 2nd insulating metal substrate (90) is the flat-surface configurations of case material (72) and abbreviation identitas, and the hole (92) of the same axle is formed in the location corresponding to the screwhole (74) of the case material (72) mentioned later.

[0004] After various pads (64), (66), and a track (65) carry out the hotpress of the clad plate of the thermosetting insulation resin which has the adhesive property of polyimide resin etc., and the copper foil of 35 micrometer thickness of abbreviation to the 1st insulating metal substrate (60) by the temperature of 150 degrees C - 170 degrees C, and the pressure of 50-100kg per square centimeter, they carry out carrying out photoetching of the copper foil etc., and are formed in a predetermined pattern. In addition, full hardening of said thermosetting insulation resin is carried out at this hotpress process, and it serves as the 1st insulating layer (62) of 35 micrometer thickness of abbreviation.

[0005] A chip is used for semiconductor devices, such as an integrated circuit device (68), and other circuit elements, and an integrated circuit device (68) fixes to a die bond pad (66) with a silver paste etc. Moreover, solder fixing of the variant components, such as a chip capacitor or a chip resistor, and an external lead (70), is carried out. After making these circuit elements adhere to the solder paste screen-stenciled on the predetermined pad (66) temporarily, a reflow of them is carried out and full fixing is carried out.

[0006] Case material (72) carries out injection molding for example, of the fiber glass lane hose PET (FRPET) to the shape of an abbreviation cube type, and is usually equipped with the

screwhole (74) which combines hybrid integrated circuit equipment with the longitudinal direction edge at a heat sink. This case material (72) uses an epoxy sinking-in polyester non-woven fabric as an adhesion sheet, carries out heating sticking by pressure (125 degrees C, 8 hours), fixes in the terminal side section of the 1st insulating metal substrate (60), and closes that loading circuit element. Then, the 2nd insulating metal substrate (90) pastes the rear face of the 1st insulating metal substrate (60) by the 2nd insulating layer (94), such as thermosetting insulation resin and silicon resin. And the high insulation with the circuit on a heat sink and the 1st insulating metal substrate (60) is attained by this 2nd insulating layer (94).

[0007]

[Problem(s) to be Solved by the Invention] The high proof-pressure structure where conventional hybrid integrated circuit equipment fits the application of the high voltage further although remarkable insulating strength is obtained by that anodizing of the front face of the 1st and 2nd insulating metal substrates (60) and (90) is carried out, the 1st and 2nd insulating layers (62), and (94) is searched for.

[0008] In addition, although high pressure-proofing-ization is attained by designing greatly distance with the screwhole (74) which combines the 1st end face and hybrid integrated circuit equipment of an insulating metal substrate (60) with a heat sink, it has the problem which cannot meet the demand of a miniaturization. Therefore, the purpose of this invention is high proof-pressure structure, and it is in offering small hybrid integrated circuit equipment.

[0009]

[Means for Solving the Problem] Invention of claim 1 forms in the 2nd insulating metal substrate the bush hole for the screw combined with a heat sink, and is characterized [main] by the point which pressed the bush fit at this bush hole. Invention of claim 2 is characterized [main] by the point which formed the resin rich area in the wall of the case material which closes the loading circuit element of the 1st insulating metal substrate.

[0010] Invention of claim 3 is characterized [main] by the point which formed the resin rich area in the wall of the latest case material at the screwhole combined with a heat sink.

[0011]

[Function] Forming the bush hole for the screw combined with the 2nd insulating metal substrate at a heat sink, the configuration of claim 1 which presses a bush fit in this bush hole carries out pre-insulation of the bush hole cross section of the 2nd insulating metal substrate, and insulates between the circuit on the 1st insulation metal substrate, and the 2nd insulating metal substrate.

[0012] The configuration of claim 2 which forms a resin rich area in the wall of the case material which closes the loading circuit element of the 1st insulating metal substrate carries out pre-insulation of the end face of the 1st insulation metal substrate, and the cross section of the screwhole of the 2nd insulating metal substrate by osmosis of the resin of a resin rich area. The configuration of claim 3 which forms a resin rich area in the screwhole combined with a heat sink at the wall of the latest case material makes it possible to carry out pre-insulation of the end face of the 1st insulation metal substrate, and the cross section of the screwhole of the 2nd insulating metal substrate according to simpler structure and a process.

[0013]

[Example] The 1st example of this invention is explained with reference to drawing 1 . In addition, drawing 1 shows the structure corresponding to the structure in the circle of the conventional example shown in drawing 4 with the sectional view. The hybrid integrated circuit equipment of this invention consists of the case material [which closes the loading component of the 1st insulating metal substrate (10) which carries a semiconductor device and other circuit

elements, and this 1st insulating metal substrate (10)] (20), and 2nd insulating metal substrate (40) which are used a sake [on an insulating disposition] mainly.
[0014] In consideration of a heat dissipation property and workability, the aluminum of 2mm thickness of abbreviation is used for the 1st and 2nd insulating metal substrates (10) and (40), and anodizing of the front face is carried out for improvement in insulation. The 1st insulating metal substrate (10) is a rectangle, and when hybrid integrated circuit equipment carries out abbreviation completion, the division press of it is carried out from the hybrid integrated circuit equipment substrate of a unit a number unit thru/or more than 10 at the size of unit hybrid integrated circuit equipment. Moreover, the 2nd insulating metal substrate (40) is the flat-surface configurations of case material (20) and abbreviation identitas, and is a large area from the 1st insulating metal substrate (10).
[0015] After a wire bonding pad (14), a die bond pad (16), other pads, and a track (not shown) carry out the hotpress of the clad plate of the thermosetting insulation resin which has the adhesive property of polyimide resin etc., and the copper foil of 35 micrometer thickness of abbreviation to the 1st insulating metal substrate (10) by the temperature of 150 degrees C - 170 degrees C, and the pressure of 50-100kg per square centimeter, they carry out carrying out photoetching of the copper foil etc., and are formed in a predetermined pattern. In addition, full hardening of said thermosetting insulation resin is carried out at this hotpress process, and it serves as an insulating layer (12) of 35 micrometer thickness of abbreviation.
[0016] A chip is used for semiconductor devices, such as an integrated circuit device (18), and other circuit elements, and it fixes to a predetermined pad (16) with a silver paste etc. Moreover, solder fixing of the variant components, such as a chip capacitor or a chip resistor, and an external lead (neither is illustrated), is carried out. After screen-stenciling a solder paste and making it adhere to this temporarily on a predetermined pad, a reflow of these circuit elements is carried out, and full fixing is carried out.
[0017] Case material (20) carries out injection molding of the fiber glass lane hose PET (FRPET) to the shape of an abbreviation cube type, and is obtained. An epoxy sinking-in polyester non-woven fabric is used as an adhesion sheet for the wall (26) of case material (20). Heating sticking by pressure (125 degrees C, 8 hours) is carried out to the periphery of the 1st insulating metal substrate (10). After closing the loading component of the 1st insulating metal substrate (10), the 2nd insulating metal substrate (40) fixes to the opposite side of the integrated-circuit-device loading side of the 1st insulating metal substrate (10) by the 2nd insulating layer (44) by silicon resin or usual thermosetting resin.
[0018] The screwhole (22) for combining this hybrid integrated circuit equipment with a heat sink is formed in the nearest to an edge of the longitudinal direction of the 1st insulating metal substrate (10) by case material (20), and the bush hole of the diameter of macrostomia is formed in that lower part from a screwhole (22) at it at it. Moreover, the step (34) for the alignment of the 2nd insulating metal substrate (40) is formed in two or more sides of the lower part of case material (20). On the other hand, a bush hole (42) is formed in the location corresponding to the 1st screwhole (22) or bush hole of an insulating metal substrate (10) at the 2nd insulating metal substrate (40), and coaxial arrangement of the screwhole (22) of case material (20) and the bush hole (42) of the 2nd insulating metal substrate (40) is carried out by fixing of the 2nd insulating metal substrate (40).
[0019] a bush (50) equipped with a screwhole (52) -- chlorofluocarbon resin -- the bush hole (42) of the 2nd insulating metal substrate (40) -- some -- the diameter of macrostomia -- moreover, it is formed for a long time than the thickness of the 2nd insulating metal substrate (40), and is

pressed fit in a bush hole (42). In this example constituted as mentioned above, since the cross section of the bush hole (42) of the 2nd insulating metal substrate (40) is covered with a bush (50), the high insulation between the circuit on the 1st insulating metal substrate (10) and the 2nd insulating metal substrate (40) is secured. Moreover, the circuit on the 1st insulating metal substrate (10) and the creeping distance between screws increase. For this reason, distance of the edge of the 1st insulating metal substrate (10) and the screwhole (22) of case material (20) can be shortened, and the miniaturization of hybrid integrated circuit equipment is attained.

[0020] The 2nd example of this invention is explained with reference to drawing 2 . In addition, drawing 2 also shows the structure corresponding to the structure in the circle of the conventional example shown in drawing 4 with the sectional view, and is using the same sign for the part corresponding to a previous example. In this example, the slot (28) used for the wall (26) of case material (20) as a resin rich area is formed, and fluid thermosetting resin (48) is applied to this slot (28) with a proper means just before heating sticking by pressure of the 1st insulating metal substrate (10) and case material (20). In the state of illustration at and the time of heat treatment which fixes the 1st and 2nd insulating metal substrates (10) and (40) The gap of the 1st and 2nd insulating metal substrates (10), (40), and case material (20) is permeated, and the thermosetting resin (48) applied to the slot (28) hardens, and covers completely the edge of the 1st insulating metal substrate (10), and the cross section of the bush hole (42) of the 2nd insulating metal substrate (40). In addition, if it forms in a part of location near a screwhole (22), it is sufficient for the slot (28) of case material (20).

[0021] Although the gap of the 1st and 2nd insulating metal substrates (10), (40), and case material (20) is greatly drawn for explanation, drawing 2 According to this example, between the circuit on the 1st insulating metal substrate (10), and the 2nd insulating metal substrate (40), Or since the creeping discharge between the screws which are not illustrated is prevented, substrate size of the 1st insulating metal substrate (10) and the 2nd insulating metal substrate (40) can be made almost the same, and a very small hybrid integrated circuit is obtained.

[0022]

[Effect of the Invention] As stated above, in order to form the bush hole for the screw which combines the hybrid integrated circuit equipment of this invention with a heat sink at the 2nd insulating metal substrate and to press a bush fit in this bush hole, pre-insulation of the bush hole cross section of the 2nd insulating metal substrate is carried out, size of the 1st and 2nd insulating metal substrates can be made into abbreviation identitas, and a result and a miniaturization are attained.

[0023] Moreover, since a resin rich area is formed in the wall of the case material which closes the loading circuit element of the 1st insulating metal substrate, pre-insulation of the end face of the 1st insulation metal substrate and the cross section of the screwhole of the 2nd insulating metal substrate can be carried out by osmosis of the resin of a resin rich area. Consequently, a miniaturization is attained. Furthermore, in order to form a resin rich area in the wall of the latest case material at the screwhole combined with a heat sink, it becomes possible to carry out pre-insulation of the end face of the 1st insulation metal substrate, and the cross section of the screwhole of the 2nd insulating metal substrate according to simpler case material structure and a process.

CLAIMS

[Claim(s)]
[Claim 1] The 1st insulating metal substrate which fixed two or more integrated circuit devices, and was carried on the circuit pattern, The case material which is equipped with the screwhole for combining hybrid integrated circuit equipment with a heat sink, and closes the loading circuit element of said 1st insulating metal substrate, The 2nd insulating metal substrate which a bush hole is formed in the location corresponding to the screwhole of said case material, and fixes with insulating adhesives to the opposite side of the integrated-circuit-device loading side of the 1st insulating metal substrate, Hybrid integrated circuit equipment which consists of bushes pressed fit in the bush hole of said 2nd insulating metal substrate.
[Claim 2] The 1st insulating metal substrate which fixed two or more integrated circuit devices, and was carried on the circuit pattern, The case material which formed the resin rich area in the wall which is equipped with the screwhole for combining hybrid integrated circuit equipment with a heat sink, and closes the loading circuit element of the 1st insulating metal substrate, Hybrid integrated circuit equipment characterized by carrying out the clothing of the edge of the 1st insulating metal substrate with the resin which consists of the 2nd insulating metal substrate which fixes with insulating adhesives to the opposite side of the integrated-circuit-device loading side of said 1st insulating metal substrate, and permeates from the resin rich area of said case material.
[Claim 3] The 1st insulating metal substrate which fixed two or more integrated circuit devices, and was carried on the circuit pattern, The case material in which the resin rich area was formed near [said] the screwhole of the wall which is equipped with the screwhole for combining hybrid integrated circuit equipment with a heat sink, and closes the loading circuit element of the 1st insulating metal substrate, Hybrid integrated circuit equipment which consists of the 2nd insulating metal substrate which fixes with insulating adhesives to the opposite side of the integrated-circuit-device loading side of said 1st insulating metal substrate.